# 1985 EDITORIAL SUBJECT INDEX *

*CONTROL ENGINEERING Volume 32 . . . January-December 1985*

(N) News (ED) Editorial 2Oct—October 2nd Edition

* For a directory to control products and companies, see CONTROL ENGINEERING's 1986 Control Product Specifier issue, November 1985, 2nd Edition.


## A

**AC DRIVES**
Motor drives 1985: programmable motion control. Bailey, S. ... Apr 159
**ACTUATORS**
Change still ferments beneath the surface (ED) ... Oct 49
Microstepping a linear motor. Morris, H. ... Feb 83
Microstepping for greater position resolution. Arnold, F. ... Jan 111
Powering the robotic arm. Morris, H. ... Mar 92
Servo design: software closes the loop. Bailey, S. ... Feb 57
Single chopper drive handles stepper motors to 5.0 a. ... Mar 64
Single motor linear actuator controls 16 motions ... Sep 100
Trends in control (actuators part of control business) ... Feb 156
Valve actuators get smart. Blickley, G. ... Oct 81
**ADAPTIVE CONTROL**
Boiler dynamic load control and optimization. Polonyi, M. ... Sep 266
Cobbles reduced on bar mill ... Apr 112
Distributed digital control of boiler turbines. Lowe, J. ... Apr 169
Expert system capabilities for distributed control. Moore, R. ... Apr 118
Temperature loops with "knowledge-based" authority. Bailey, S. ... Jun 109
**AMPLIFIERS, see Power supplies and controllers**
**ANALOG—TO—DIGITAL CONVERTERS**
Today's analog-to-digital converter: going for it all with CMOS. Babb, M. ... Dec 47
Ten-bit serial output A/D converter on a single chip ... Aug 39
**ANALYSIS INSTRUMENTS**
DMM measures Hz and period ... Apr 114
New system integrates testing. Babb, M. ... Apr 166
On-line analyzers reach control room. Blickley, G. ... Dec 50
Tough sulphur dioxide monitor survives stack's wet scrubber ... Sep 94
**ARTIFICIAL INTELLIGENCE**
DC-3: an industrial expert system. Taylor, W. ... Aug 85
Expert system capabilities for distributed control. Moore, R. ... Apr 118
Implementing system diagnostics and failure prediction. Cherba, D. ... Sep 159
**ANNUNCIATORS, see Data display**
**AUTOMATIC FACTORY, see Manufacturing control**

## B

**BATCHING, see Weighing and batching**
**BATTERIES**
Automatic battery test systems modernized by updated approach ... Sep 84
**BUSINESS**
Bad management: business gloom (ED) ... Jul 49
College of unintended consequences. Laduzinsky, A. ... Nov 13
Control engineers use more computers. Laduzinsky, A. ... Sep 13
Controls market approaches critical mass (ED) ... Feb 49
First Japanese Multibus boards land in USA (N) ... Dec 25
GE expands programmable controller market in Far East (N) ... Feb 21
Get those loops closed! (ED) ... Sep 103
Go go industrial control. Laduzinsky, A. ... Feb 13
Guardian will market Hitachi programmable controllers (N) ... Feb 29
Japan's MAP moves (N) ... 2Oct 10
MAP: what's it worth to you? Laduzinsky, A. ... 2Oct 5
Mazda contracts Honeywell to automate factory (N) ... Dec 21
Microcosmic control, part 1. Laduzinsky, A. ... Dec 13
No matter how much things change. Laduzinsky, A. ... Aug 13
Profit from the coming boom in industrial automation. Laduzinsky, A. ... Mar 13
Rexnord announces merger agreement, acquisition (N) ... Feb 25
Telemecanique makes plans to expand in control (N) ... Apr 32
Trends in control (acquisitions decrease suppliers) ... Mar 220
Trends in control (actuators part of control business) ... Feb 156
Trends in control (anything new in control equipment?) ... Dec 134
Trends in control (retrofitting boosts control industry) ... Sep 278
Twelve manufacturers show support for Multibus II (N) ... Jun 24
VMEbus market shows promise as US acceptance increases. Cope, M. ... Aug 110
World controls business: up 17 percent (ED) ... Jan 63

## C

**CAD/CAE/CAM**
CIM system goes beyond CAD/CAM. Searle, D. ... Feb 50
Factory automation plan for assembly plant. Ehrig, H. ... Feb 149
Robot programming goes off-line. Morris, H. ... Sep 143
**COMPANIES**
Allen-Bradley negotiates for Indiana General Ferrite (N) ... Aug 24
Allen-Bradley sold to Rockwell (N) ... Feb 21
Allen-Bradley will sell IBM industrial computers (N) ... May 24
AT&T buys foreign facilities of Synertek (N) ... Jul 21
Beta Products bought by Hathaway Corp. (N) ... Aug 22
Boeing/GM co-sponsor MAP/office internet demo (N) ... Apr 31
Chip set by Gould and Concord (N) ... Apr 31
Combustion Engineering aids Arab process control (N) ... Jul 21
Digital extends Ethernet approach to LANs (N) ... Mar 24
Eagle Signal Controls will work with GM MAP group (N) ... Jan 19
Fairchild acquires Robertshaw product line (N) ... Aug 21
Ferranti supports MAP (N) ... 2Oct 10
Ford, Measurex join in CIM development (N) ... Nov 19
Ford terms MAP a breakthrough (N) ... Jan 19
GE expands programmable controller market in Far East (N) ... Feb 21
GE plans MAP-compliant factory LAN (N) ... 2Oct 10
GE, Ungermann-Bass form company (N) ... Apr 31
GM asks SME to handle MAP user group meetings (N) ... Jun 21
Go go industrial control. Laduzinsky, A. ... Feb 13
Gould adds two programmable controllers (N) ... Nov 19
Guardian will market Hitachi programmable controllers (N) ... Feb 29
Honeywell opens VHISC plant in Colorado (N) ... Aug 21
IBM announces token ring local area network (N) ... Nov 19
IBM "gets tough" on industrial control (ED) ... Nov 53
Indev Controls now part of Barber-Coleman Co. (N) ... Aug 26
INI contracts to put MAP networks in 5 GM plants (N) ... Jun 21
INI makes MAP-compatible LAN chips (N) ... Aug 21
Intel explains new networking strategy (N) ... May 22
Intel introduces 80386 32-bit chip, boards, and software (N) ... Oct 23
International Cybernetics acquired by Gould (N) ... Sep 22
Japan's MAP moves (N) ... 2Oct 10
Mark IV Industries buys LFE Corp. (N) ... Jul 26
Mazda contracts Honeywell to automate factory (N) ... Dec 21
Mitsubishi in U.S. marketing push of larger controllers (N) ... Jul 21
Motorola intros its MAP VLSI chip and interface board (N) ... 2Oct 9
NCR and Motorola sign ASIC agreement (N) ... Sep 21
Perkin-Elmer presents "cruncher" supermini (N) ... Nov 19
Phillips joins Siemens in mega IC research (N) ... Jan 19
Rexnord announces merger agreement, acquisition (N) ... Feb 25
Telemecanique makes plans to expand in control (N) ... Apr 32
TI, National Semiconductor plan design exchange (N) ... Apr 34
Toshiba moves up in Japanese process control (N) ... Oct 24
Trends in control (control companies broaden markets) ... Oct 186
Trends in control (small companies feature unique MPU products) ... Jun 209
Ungermann-Bass, Microsoft sign network agreement (N) ... Jul 24
Vickers buys worldwide fluid power operations (N) ... May 19
Who's MAP compatible? (N) ... 2Oct 9
**COMPUTER CONTROL**
Computerized stone crusher ... Jun 70
Fault-tolerant control means never having to say you're sorry. Laduzinsky, A. ... Feb 71
Modular automation controllers cut cost, development time. Klein, G. ... Dec 66
Retieval cycle reduced by half at plant using GE controlled system ... Dec 32
SCADA systems affected by distributed control. Blickley, G. ... Mar 79
**COMPUTER PERIPHERAL DEVICES**
Peripherals: making intelligent controllers comfortable. Laduzinsky, A. ... May 63
**COMPUTER SOFTWARE, see Software, control**
**COMPUTERS**
Adapting Unix to the industrial market. Crow, D. ... Aug 100
Control engineers use more computers. Laduzinsky, A. ... Sep 13
Fault-tolerant control means never having to say you're sorry. Laduzinsky, A. ... Feb 71
New system integrates testing. Babb, M. ... Apr 166
Perkin-Elmer presents "cruncher" supermini (N) ... Nov 19
Software will alter control practice in the 1980s. Bailey, S. ... May 89
**CONTROL ENGINEERS, PROFESSIONAL DEVELOPMENT**
Choosing a petrochemical process control consultant. Senyard, W. ... Apr 304

# 1985 EDITORIAL SUBJECT INDEX *

*CONTROL ENGINEERING Volume 32 . . . January-December 1985*

(N) News (ED) Editorial 2Oct—October 2nd Edition

* For a directory to control products and companies, see CONTROL ENGINEERING's 1986 Control Product Specifier issue, November 1985, 2nd Edition.


## A

**AC DRIVES**
Motor drives 1985: programmable motion control. Bailey, S. ... Apr 159
**ACTUATORS**
Change still ferments beneath the surface (ED) ... Oct 49
Microstepping a linear motor. Morris, H. ... Feb 83
Microstepping for greater position resolution. Arnold, F. ... Jan 111
Powering the robotic arm. Morris, H. ... Mar 92
Servo design: software closes the loop. Bailey, S. ... Feb 57
Single chopper drive handles stepper motors to 5.0 a. ... Mar 64
Single motor linear actuator controls 16 motions ... Sep 100
Trends in control (actuators part of control business) ... Feb 156
Valve actuators get smart. Blickley, G. ... Oct 81
**ADAPTIVE CONTROL**
Boiler dynamic load control and optimization. Polonyi, M. ... Sep 266
Cobbles reduced on bar mill ... Apr 112
Distributed digital control of boiler turbines. Lowe, J. ... Apr 169
Expert system capabilities for distributed control. Moore, R. ... Apr 118
Temperature loops with "knowledge-based" authority. Bailey, S. ... Jun 109
**AMPLIFIERS, see Power supplies and controllers**
**ANALOG—TO—DIGITAL CONVERTERS**
Today's analog-to-digital converter: going for it all with CMOS. Babb, M. ... Dec 47
Ten-bit serial output A/D converter on a single chip ... Aug 39
**ANALYSIS INSTRUMENTS**
DMM measures Hz and period ... Apr 114
New system integrates testing. Babb, M. ... Apr 166
On-line analyzers reach control room. Blickley, G. ... Dec 50
Tough sulphur dioxide monitor survives stack's wet scrubber ... Sep 94
**ARTIFICIAL INTELLIGENCE**
DC-3: an industrial expert system. Taylor, W. ... Aug 85
Expert system capabilities for distributed control. Moore, R. ... Apr 118
Implementing system diagnostics and failure prediction. Cherba, D. ... Sep 159
**ANNUNCIATORS, see Data display**
**AUTOMATIC FACTORY, see Manufacturing control**

## B

**BATCHING, see Weighing and batching**
**BATTERIES**
Automatic battery test systems modernized by updated approach ... Sep 84
**BUSINESS**
Bad management: business gloom (ED) ... Jul 49
College of unintended consequences. Laduzinsky, A. ... Nov 13
Control engineers use more computers. Laduzinsky, A. ... Sep 13
Controls market approaches critical mass (ED) ... Feb 49
First Japanese Multibus boards land in USA (N) ... Dec 25
GE expands programmable controller market in Far East (N) ... Feb 21
Get those loops closed! (ED) ... Sep 103
Go go industrial control. Laduzinsky, A. ... Feb 13
Guardian will market Hitachi programmable controllers (N) ... Feb 29
Japan's MAP moves (N) ... 2Oct 10
MAP: what's it worth to you? Laduzinsky, A. ... 2Oct 5
Mazda contracts Honeywell to automate factory (N) ... Dec 21
Microcosmic control, part 1. Laduzinsky, A. ... Dec 13
No matter how much things change. Laduzinsky, A. ... Aug 13
Profit from the coming boom in industrial automation. Laduzinsky, A. ... Mar 13
Rexnord announces merger agreement, acquisition (N) ... Feb 25
Telemecanique makes plans to expand in control (N) ... Apr 32
Trends in control (acquisitions decrease suppliers) ... Mar 220
Trends in control (actuators part of control business) ... Feb 156
Trends in control (anything new in control equipment?) ... Dec 134
Trends in control (retrofitting boosts control industry) ... Sep 278
Twelve manufacturers show support for Multibus II (N) ... Jun 24
VMEbus market shows promise as US acceptance increases. Cope, M. ... Aug 110
World controls business: up 17 percent (ED) ... Jan 63

## C

**CAD/CAE/CAM**
CIM system goes beyond CAD/CAM. Searle, D. ... Feb 50
Factory automation plan for assembly plant. Ehrig, H. ... Feb 149
Robot programming goes off-line. Morris, H. ... Sep 143
**COMPANIES**
Allen-Bradley negotiates for Indiana General Ferrite (N) ... Aug 24
Allen-Bradley sold to Rockwell (N) ... Feb 21
Allen-Bradley will sell IBM industrial computers (N) ... May 24
AT&T buys foreign facilities of Synertek (N) ... Jul 21
Beta Products bought by Hathaway Corp. (N) ... Aug 22
Boeing/GM co-sponsor MAP/office internet demo (N) ... Apr 31
Chip set by Gould and Concord (N) ... Apr 31
Combustion Engineering aids Arab process control (N) ... Jul 21
Digital extends Ethernet approach to LANs (N) ... Mar 24
Eagle Signal Controls will work with GM MAP group (N) ... Jan 19
Fairchild acquires Robertshaw product line (N) ... Aug 21
Ferranti supports MAP (N) ... 2Oct 10
Ford, Measurex join in CIM development (N) ... Nov 19
Ford terms MAP a breakthrough (N) ... Jan 19
GE expands programmable controller market in Far East (N) ... Feb 21
GE plans MAP-compliant factory LAN (N) ... 2Oct 10
GE, Ungermann-Bass form company (N) ... Apr 31
GM asks SME to handle MAP user group meetings (N) ... Jun 21
Go go industrial control. Laduzinsky, A. ... Feb 13
Gould adds two programmable controllers (N) ... Nov 19
Guardian will market Hitachi programmable controllers (N) ... Feb 29
Honeywell opens VHISC plant in Colorado (N) ... Aug 21
IBM announces token ring local area network (N) ... Nov 19
IBM "gets tough" on industrial control (ED) ... Nov 53
Indev Controls now part of Barber-Coleman Co. (N) ... Aug 26
INI contracts to put MAP networks in 5 GM plants (N) ... Jun 21
INI makes MAP-compatible LAN chips (N) ... Aug 21
Intel explains new networking strategy (N) ... May 22
Intel introduces 80386 32-bit chip, boards, and software (N) ... Oct 23
International Cybernetics acquired by Gould (N) ... Sep 22
Japan's MAP moves (N) ... 2Oct 10
Mark IV Industries buys LFE Corp. (N) ... Jul 26
Mazda contracts Honeywell to automate factory (N) ... Dec 21
Mitsubishi in U.S. marketing push of larger controllers (N) ... Jul 21
Motorola intros its MAP VLSI chip and interface board (N) ... 2Oct 9
NCR and Motorola sign ASIC agreement (N) ... Sep 21
Perkin-Elmer presents "cruncher" supermini (N) ... Nov 19
Phillips joins Siemens in mega IC research (N) ... Jan 19
Rexnord announces merger agreement, acquisition (N) ... Feb 25
Telemecanique makes plans to expand in control (N) ... Apr 32
TI, National Semiconductor plan design exchange (N) ... Apr 34
Toshiba moves up in Japanese process control (N) ... Oct 24
Trends in control (control companies broaden markets) ... Oct 186
Trends in control (small companies feature unique MPU products) ... Jun 209
Ungermann-Bass, Microsoft sign network agreement (N) ... Jul 24
Vickers buys worldwide fluid power operations (N) ... May 19
Who's MAP compatible? (N) ... 2Oct 9
**COMPUTER CONTROL**
Computerized stone crusher ... Jun 70
Fault-tolerant control means never having to say you're sorry. Laduzinsky, A. ... Feb 71
Modular automation controllers cut cost, development time. Klein, G. ... Dec 66
Retieval cycle reduced by half at plant using GE controlled system ... Dec 32
SCADA systems affected by distributed control. Blickley, G. ... Mar 79
**COMPUTER PERIPHERAL DEVICES**
Peripherals: making intelligent controllers comfortable. Laduzinsky, A. ... May 63
**COMPUTER SOFTWARE, see Software, control**
**COMPUTERS**
Adapting Unix to the industrial market. Crow, D. ... Aug 100
Control engineers use more computers. Laduzinsky, A. ... Sep 13
Fault-tolerant control means never having to say you're sorry. Laduzinsky, A. ... Feb 71
New system integrates testing. Babb, M. ... Apr 166
Perkin-Elmer presents "cruncher" supermini (N) ... Nov 19
Software will alter control practice in the 1980s. Bailey, S. ... May 89
**CONTROL ENGINEERS, PROFESSIONAL DEVELOPMENT**
Choosing a petrochemical process control consultant. Senyard, W. ... Apr 304

Summer short courses help you move up. Axelson, B. ... Apr 147
Today's CONTROL ENGINEERING reader: doing more control. Laduzinsky, A. ... Nov 72
Trends in control (companies reduce knowledge of CE) ... Nov 144
Trends in control (control engineers in short supply) ... Apr 322
Trends in control (early retirement packages) ... Jul 144
Trends in control (engineers retire, become consultants) ... Aug 168
Trends in control (talent needed to develop control systems) ... Jan 186
**CONTROL SIGNAL TRANSMISSION, see Data transmission**
**CONTROLLERS, see Process controllers, also Power supplies and controllers, also Programmable controllers**
**CRT DISPLAYS, see Data display**


## D


**DATA ACQUISITION**
Automatic battery test systems modernized by updated approach ... Sep 84
Today's analog-to-digital converter: going for it all with CMOS. Babb, M. ... Dec 47
On-line analyzers reach control room. Blickley, G. ... Dec 50
Peripherals: making intelligent controllers comfortable. Laduzinsky, A. ... May 63
Remote level systems keep pace with demand. Blickley, G. ... Jul 61
SCADA systems affected by distributed control. Blickley, G. ... Mar 79
Software eases real-time color graphics development. Laduzinsky, A. ... Mar 96
**DATA BUSES**
A standard local network for industrial use. Pinkowitz, D. ... Oct 56
Autofact demonstration advances MAP (N) Dec 21
Build factory floor communications from a MAP base. Nelson, P. ... 2Oct 44
Connecting dissimilar controllers and LANs. Kmack, K. and Weaver, T. ... Oct 55
Data buses simplify MPU system integration. Floyd, R. ... Nov 75
Installing a broadband cable system for a LAN. Ebert, D. ... 2Oct 28
VMEbus demands high performance packaging. Laduzinsky, A. ... Aug 108
Will standards develop for serial communications buses? Laduzinsky, A. ... Oct 51
**DATA DISPLAY**
Faster chips for process control. Stohlberg, J. ... Nov 140
On-line analyzers reach control room. Blickley, G. ... Dec 50
Operator interface improvements in distributed control. Blickley, G. ... Apr 152
Recent trends in control panels and terminals. Flynn, R. ... Jun 116
Software eases real-time color graphics development. Laduzinsky, A. ... Mar 96
**DATA HIGHWAYS, see Local area networks**
**DATA TRANSMISSION**
Digital process measurements transmitted by fiber optics. Blickley, G. ... Jan 95
On-line analyzers reach control room. Blickley, G. ... Dec 50
**DISTRIBUTED CONTROL**
Change still ferments beneath the surface (ED) ... Oct 49
Cobbles reduced on bar mill ... Apr 112
Distributed control system expandable for plantwide management. Blickley, G. ... Feb 80
Distributed control systems: new, improved at ISA/85. Blickley, G. ... Sep 150
Distributed control system uses open highway. Blickley, G. ... Apr 156
Distributed digital control of boiler turbines. Lowe, J. ... Apr 169
Expert system capabilities for distributed control. Moore, R. ... Apr 118
MAP's impact on process plants. McCarthy, J. ... 2Oct 67
Operator interface improvements in distributed control. Blickley, G. ... Apr 152
Process control at fingertips ... Jan 44
Process control system integrates design and control. Babb, M. ... Nov 81
Remote level systems keep pace with demand. Blickley, G. ... Jul 61
SCADA systems affected by distributed control. Blickley, G. ... Mar 79
Selecting a batch control system. Lippin, J. ... Jul 73
Software puts personal computers into distributed control. Bailey, S. ... Oct 65
Using distributed programmable controllers in a structural board plant. Ouellette, R. ... Oct 177


## E


**EDITORIALS**
At long last: control is control is control (ED) Dec 39
Bad management: business gloom (ED) ... Jul 49
Change still ferments beneath the surface (ED) ... Oct 49
Control engineering getting a new spotlight (ED) ... Apr 117
Controls market approaches critical mass (ED) ... Feb 49
Electronics in control engineering, continued. (ED) ... May 61
Facing up to reality about automation (ED) 2Oct 17
Factory automation software can't be packaged (ED) ... Aug 47
Get those loops closed! (ED) ... Sep 103
IBM "gets tough" on industrial control (ED) Nov 53
Needed: a realistic view of factory automation (ED) ... Jun 79
Semiconductors expand horizons of control (ED) ... Mar 69
World controls business: up 17 percent (ED) Jan 63

***M-Unit: your first choice for industrial signal conditioning, with Total Performance you can depend upon.***

The M-Unit series is a line of compact modular plug-in signal conditioners manufactured by M-System Co., Ltd., the pioneer of this innovative design. Since its introduction more than ten years ago, the M-Unit series has been designed and engineered to meet the ***Total Performance*** demanded in contemporary instrumentation – high technical performance, easy application, and immediate availability.

**Current/Voltage Transmitters**
Voltage Transmitters
Isolators
AC Transmitters

**Temperature Transmitters**
Thermocouple Transmitters
RTD Transmitters
Differential RTD Transmitters

**Alarms**

**Dynamic Transmitters**
Potentiometer Transmitters
Pulse Frequency Transmitters
Tachogenerator Transmitters
Load Cell Transmitters

**Optical Transmitters**

**Pneumatic Transducers**
P/E Transducers
E/P Transducers

**Signal Scalers**
Peak Holder
Tracker—Holder
Signal Limiter
Rate Limiter/Ramp Buffer
Delay Buffer
Signal Reverser

**Signal Level Preselectors**

**M-SYSTEM CO.,LTD.**

P.O. Box 14197
Torrance California 90503
Telephone 213/542-1937

**Head Office**
Eiko Building
4-12-1 Hannan-Cho Abeno-Ku
Osaka 545, Japan

**Branch Office**
Kamiya Building
2-15-22 Kamiosaki, Shinagawa Ku
Tokyo 545, Japan

CIRCLE **79** ON INQUIRY CARD

**EDUCATION See Control engineers, professional development**
**ELECTRIC GENERATION CONTROL**
Designing a solar thermal repowering system using dynamic simulation. Labbe, D. ..... Dec 120
Distributed digital control of boiler turbines. Lowe, J. ..... Apr 169
**ELECTRONICS**
Electronics in control engineering, continued. (ED) ..... May 61
IC advances still drive control technology. Kompass, E. ..... May 76
World's biggest electronics show: Munich's Electronica 84. Lee-Frampton, J. ..... Jan 108
**ENERGY CONSERVATION AND CONTROL**
Designing a solar thermal repowering system using dynamic simulation. Labbe, D. ..... Dec 120
Toymaker doesn't play around when it comes to energy management ..... 47

F

**FIBER OPTICS**
Digital process measurements transmitted by fiber optics. Blickley, G. ..... Jan 95
Micromechanics, fiber optics: new sensor performance. Babb, M. ..... Nov 54
Recent trends in industrial LANs. Babb, M. Aug 63
Tank-truck loader computer connected by fiber optics ..... Jan 55
**FLOW**
Calibration of velocity sensors for flow instrumentation ..... Jun 64
Flowmeter technologies: not standing still. Blickley, G. ..... Aug 77
**FLUID POWER**
Fluid power exposition draws crowd in Chicago (N) ..... Feb 21
Fluid power rises to meet challengers. Henke, R. ..... May 71
Vickers buys worldwide fluid power operations (N) ..... May 19
**FURNACE CONTROL**
Boiler dynamic load control and optimization. Polonyi, M. ..... Sep 266
Designing a solar thermal repowering system using dynamic simulation. Labbe, D. ..... Dec 120
Distributed digital control of boiler turbines. Lowe, J. ..... Apr 169

G

**GRAPHIC DISPLAYS, see Data display**

H

**HIERARCHICAL CONTROL, see Computer control**
**HYDRAULICS, see Fluid power**

I

**INDUSTRIAL CONTROL, see Manufacturing control**
**INTEGRATED CIRCUITS**
Analog signal conditioners show MPU's influence. Laduzinsky, A. ..... Sep 132
Chip set by Gould and Concord (N) ..... Apr 31
Dynamically testing single-chip microcomputers. King, R. ..... Jun 196
Electronics in control engineering, continued. (ED) ..... May 61
Faster chips for process control. Stohlberg, J. ..... Nov 140
Honeywell opens VHISC plant in Colorado (N) ..... Aug 21
IC advances still drive control technology. Kompass, E. ..... May 76
Intel's RAM needs no interface circuitry (N) Mar 22
MAP support continues to grow; new products include VLSI (N) ..... Jun 21
Motorola intros its MAP VLSI chip and interface board (N) ..... 2Oct 9
NCR and Motorola sign ASIC agreement (N) Sep 21
Today's analog-to-digital converter: going for it all with CMOS. Babb, M. ..... Dec 47
Saving power in CMOS systems design. Niewierski, W. ..... Nov 69
Semiconductors expand horizons of control (ED) ..... Mar 69
Sixteen-bit CMOS components for industrial controllers. Long, B. ..... Mar 112
Ten-bit serial output A/D converter on a single chip ..... Aug 39
TI, National Semiconductor plan design exchange (N) ..... Apr 34
**INTERFACING WITH COMPUTERS**
Is anyone interfacing process and management's computers? Morris, H. ..... Jun 92
Protocol converter networks incompatible factory devices. Babb, M. ..... Sep 149
**INTERNATIONAL CONTROL**
AT&T buys foreign facilities of Synertek (N) Jul 21
Combustion Engineering aids Arab process control (N) ..... Jul 21
First Japanese Multibus boards land in USA (N) ..... Dec 25
Guardian will market Hitachi programmable controllers (N) ..... Feb 29
Industrial control becomes more international. Laduzinsky, A. ..... Jul 13
Japan's MAP moves (N) ..... 2Oct 10
Mazda contracts Honeywell to automate factory (N) ..... Dec 21
Phillips joins Siemens in mega IC research (N) ..... Jan 19
Telemecanique makes plans to expand in control (N) ..... Apr 32
Toshiba moves up in Japanese process control (N) ..... Oct 24
Vickers buys worldwide fluid power operations (N) ..... May 19

L

**LEVEL**
Remote level systems keep pace with demand. Blickley, G. ..... Jul 61

I-R TEMPERATURE MEASUREMENT NEWS
MIKRON®
MIKRON INSTRUMENT COMPANY INC. ★★★
445 West Main Street, Wyckoff, NJ 07481 (201) 891-7330

Another Mikron I-R Breakthrough!

A Compact, self-contained 2-color Infrared Temperature Transmitter with 4-20mA linear output.
*Patents Pending
Made in USA
Models covering temperature from 1300° to 6500°F

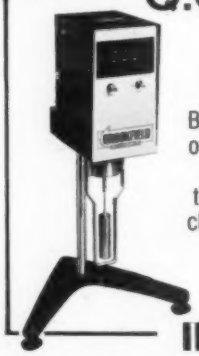
The new Mikron 77 *Infraducer** offers many unique advantages.
Temperature measurements are:
- Independent of emissivity
- Unaffected by dust and other contaminants
- Independent of target size
- Unaffected by glass or quartz windows

The Mikron 77 is a superior temperature measurement and control unit for applications above 1300°F, such as steel melting, heat treating, cement kiln, ceramics, semiconductors, etc.

Call today Toll-Free (800) 631-0176 or write for details. Telex: 361870

CIRCLE 80 ON INQUIRY CARD

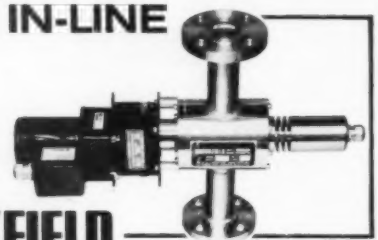
Viscosity measurement
Q.C.



Ease of use, accuracy, flexibility and reproducibility have made Brookfield Viscometers favorites all over the world. Whether for quality control in the laboratory or continuous in-line process control in a closed system, we have the instrument for your application.

IN-LINE

Send for FREE Literature



BROOKFIELD
BROOKFIELD ENGINEERING LABS., INC.
DEPT. QC-18, 240 CUSHING ST., STOUGHTON, MA 02072 USA 617-344-4310 TELEX 924-497

CIRCLE 81 ON INQUIRY CARD

**LOCAL AREA NETWORKS**
A standard local network for industrial use. Pinkowitz, D. ... Oct 56
Autofact demonstration advances MAP (N) Dec 21
College of unintended consequences. Laduzinsky, A. ... Nov 13
Connecting dissimilar controllers and LANs. Kmack, K. and Weaver, T. ... Oct 55
Connecting to MAP. Friscia, T. ... 2Oct 72
Digital extends Ethernet approach to LANs (N) ... Mar 24
Distributed control system expandable for plantwide management. Blickley, G. ... Feb 80
Distributed control system uses open highway. Blickley, G. ... Apr 156
Factory automation plan for assembly plant. Ehrig, H. ... Feb 149
GE plans MAP-compliant factory LAN (N). 2Oct 10
GE, Ungermann-Bass form company (N) ... Apr 31
High performance Ethernet controller board. Chen, P. ... Apr 316
How to plan for—and implement—a MAP network. Herbst, B. et. al. ... 2Oct 62
IBM announces token ring local area network (N) ... Nov 19
IBM "gets tough" on industrial control (ED) Nov 53
INI makes MAP-compatible LAN chips (N). Aug 21
Installing a broadband cable system for a LAN. Ebert, D. ... 2Oct 28
Intel explains new networking strategy (N) May 22
Low cost networking for islands of automation. Gallagher, M. ... 2Oct 56
MAP's impact on process plants. McCarthy, J. ... 2Oct 67
Microcosmic control, part 1. Laduzinsky, A. Dec 13
Profitable robotic work cells from islands of automation. Morris, H. ... May 81
Protocol converter networks incompatible factory devices. Babb, M. ... Sep 149
Recent trends in industrial LANs. Babb, M. Aug 63
Trends in control (MAP provides a useful LAN standard) ... 2Oct 84
Ungermann-Bass, Microsoft sign network agreement (N) ... Jul 24

## M

**MACHINE CONTROL**
CIM system goes beyond CAD/CAM. Searle, D. ... Feb 50
Modular automation controllers cut cost, development time. Klein, G. ... Dec 66
Multibus computer for industrial control applications. Shair, I. ... Mar 120
Personal computers 1985: value added control. Bailey, S. ... Jul 66
Protocol converter networks incompatible factory devices. Babb, M. ... Sep 149
Recent trends in industrial LANs. Babb, M. Aug 63
**MAINTENANCE**
DC-3: an industrial expert system. Taylor, W. Aug 85
Implementing system diagnostics and failure prediction. Cherba, D. ... Sep 159
**MAN-MACHINE INTERFACING**
Operator interface improvements in distributed control. Blickley, G. ... Apr 152
Process control at fingertips ... Jan 44
Recent trends in control panels and terminals. Flynn, R. ... Jun 116
Software eases real-time color graphics development. Laduzinsky, A. ... Mar 96
**MANUFACTURING CONTROL**
Autofact demonstration advances MAP (N) Dec 21
Baseway software shown at IPC show (N) May 19
Boeing/GM co-sponsor MAP/office internet demo (N) ... Apr 31
CIM system goes beyond CAD/CAM. Searle, D. ... Feb 50
Close the quality loops to automate manufacturing. Laduzinsky, A. ... Nov 64
Cobbles reduced on bar mill ... Apr 112
College of unintended consequences. Laduzinsky, A. ... Nov 13
Connecting to MAP. Friscia, T. ... 2Oct 72
Control engineering getting a new spotlight (ED) ... Apr 117
Distributed control system expandable for plantwide management. Blickley, G. ... Feb 80
Facing up to reality about automation (ED) 2Oct 17
Factory automation plan for assembly plant. Ehrig, H. ... Feb 149
Factory automation: a new positioning for control companies. Laduzinsky, A. ... Jun 13
Factory automation/U.S.A. and the land of Oz. Laduzinsky, A. ... Jun 98
Factory automation/U.S.A.: just the beginning. Laduzinsky, A. ... Jun 88
Factory automation software can't be packaged (ED) ... Aug 47
Fault-tolerant control means never having to say you're sorry. Laduzinsky, A. ... Feb 71
Ford, Measurex join in CIM development (N) Nov 19
Here comes Autofact '85. Axelson, B. ... Sep 131
Industry begins to apply vision systems widely. Morris, H. ... Jan 68
Low cost networking for islands of automation. Gallagher, M. ... 2Oct 56
Manufacturing technology: converging on automation ... Apr 173
Manufacturing technology '85: the real cost of automation ... Oct 85
MAP's impact on process plants. McCarthy, J. ... 2Oct 67
Mazda contracts Honeywell to automate factory (N) ... Dec 21
Modular automation controllers cut cost, development time. Klein, G. ... Dec 66
Multibus computer for industrial control applications. Shair, I. ... Mar 120
Needed: a realistic view of factory automation (ED) ... Jun 79
On-line analyzers reach control room. Blickley, G. ... Dec 50
Plastics show stresses CIM (N) ... Aug 21



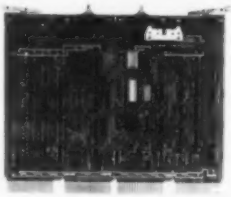
SENCON INC.

now fills the gaps

with the widest selection of switches available and the engineering skills to back them.

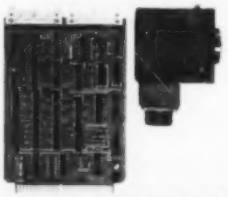
**INDUCTIVE • CAPACITIVE**
**PHOTOELECTRIC • FIBER OPTIC**

For more information contact Sean McGowan at:
6385 W.74 St., Chicago, IL 60638
SENCON INC. (312) 496-3100



C-1500 SERIES

ENCODER-TO-COMPUTER INTERFACE



Buckminster Corporation's C-1500 Series Encoder Interface Modules enable a microcomputer to keep track of position based on the outputs of incremental shaft encoders. They offer continuous operation over large distances, bidirectional measurement of linear or rotary displacement, and computer settable home position. Modules are available for the DEC LSI-11 and the Pro-Log STD bus.

The C-1500 Series is part of Buckminster's C-1000 Series of building blocks for position and motion control. Call us for more information.

BUCKMINSTER CORPORATION
99 HIGHLAND AVENUE SOMERVILLE, MA 02143
617 864-2456

CIRCLE 83 ON INQUIRY CARD

Protocol converter networks incompatible factory devices. Babb, M. ... Sep 149
Recent trends in industrial LANs. Babb, M. Aug 63
SCADA systems affected by distributed control. Blickley, G. ... Mar 79
Speed increased on can production ... Mar 58
STD Bus adopts multitasking and DOS while establishing itself in the industrial environment. Laduzinsky, A. ... Dec 53
The MAP to automation. Laduzinsky, A. ... 2Oct 19
Trends in control (retrofitting boosts control industry) ... Sep 278

**MAP**

Autofact demonstration advances MAP (N) Dec 21
Chip set by Gould and Concord (N) ... Apr 31
Connecting to MAP. Friscia, T. ... 2Oct 72
Developing standards integrate factory devices. Moon, D. ... 2Oct 49
Eagle Signal Controls will work with GM MAP group (N) ... Jan 19
Ferranti supports MAP (N) ... 2Oct 10
Ford terms MAP a breakthrough (N) ... Jan 19
GE plans MAP-compliant factory LAN (N). 2Oct 10
GE, Ungermann-Bass form company (N) ... Apr 31
GM asks SME to handle MAP user group meetings (N) ... Jun 21
Here comes Autofact '85. Axelson, B. ... Sep 131
How to plan for—and implement—a MAP network. Herbst, B. ... 2Oct 62
INI contracts to put MAP networks in 5 GM plants (N) ... Jun 21
INI makes MAP-compatible LAN chips (N). Aug 21
Japan's MAP moves (N) ... 2Oct 10
Low cost networking for islands of automation. Gallagher, M. ... 2Oct 56
MAP product testing gets under way. McMillan, A. ... 2Oct 39
MAP support continues to grow; new products include VLSI (N) ... Jun 21
MAP: what's it worth to you? Laduzinsky, A. 2Oct 5
MAP's impact on process plants. McCarthy, J. ... 2Oct 67
Microcosmic control, part 1. Laduzinsky, A. Dec 13
Motorola intros its MAP VLSI chip and interface board (N) ... 2Oct 9
The MAP specification. Crowder, R. ... 2Oct 22
The MAP to automation. Laduzinsky, A. ... 2Oct 19
Recent trends in industrial LANs. Babb, M. Aug 63
Trends in control (MAP provides a useful LAN standard) ... 2Oct 84
Who's MAP compatible? (N) ... 2Oct 9

**MEETINGS**

Advanced Control Conference: process simulation. Morris, H. ... Sep 155
Control Expo/85 conference papers. Babb, M. ... Apr 134
Eleventh Control Conference views on-line simulation (N) ... Dec 21
ISA/85 conference program: research and applications. Babb, M. ... Sep 113
Philadelphia hosts ISA/85 conference and exhibit (N) ... Sep 21
Process control symposium scheduled by ISA division (N) ... Mar 21

**MICROCOMPUTER BOARDS**

Analog I/O for the Multibus. Logan, M. ... Mar 110
Architecture improves Multibus performance. Doone, T. ... Mar 122
Board piggybacks Multibus II on Multibus I designs (N) ... Sep 24
Buscon/86 premiers January 15-16 (N) ... Sep 21
Buses within buses. Laduzinsky, A. ... Aug 106
Data buses simplify MPU system integration. Floyd, R. ... Nov 75
First Japanese Multibus boards land in USA (N) ... Dec 25
Future of STD Bus linked closely with IBM PC standards. Lee, E. ... Dec 62
High performance Ethernet controller board. Chen, P. ... Apr 316
Integrating IBM PC into STD Bus design. Finster, K. ... Dec 71
Intel explains new networking strategy (N) May 22
Intel introduces 80386 32-bit chip, boards, and software (N) ... Oct 23
Intel's RAM needs no interface circuitry (N) Mar 22
Low cost development of microprocessor system. Waymire, J. ... Nov 136
Microcomputer boards—supplying more. Laduzinsky, A. ... Apr 140
Microcosmic control, part 1. Laduzinsky, A. Dec 13
Modular automation controllers cut cost, development time. Klein, G. ... Dec 66
Motorola intros its MAP VLSI chip and interface board (N) ... 2Oct 9
Multibus computer for industrial control applications. Shair, I. ... Mar 120
Multibus: solutions for changing needs. Kinhan, T. ... Mar 108
Multibus II: multiple processor task sharing. Laduzinsky, A. ... Apr 143
Multiuse multipath Multibus. Laduzinsky, A. Mar 105
Personal computers 1985: value added control. Bailey, S. ... Jul 66
Sixteen-bit architecture upgrades STD Bus. Burckle, R. ... Dec 59
Sixteen-bit CMOS components for industrial controllers. Long, B. ... Mar 112
Sixteen-bit CPUs on STD bus (N) ... Jun 26
STD Bus adopts multitasking and DOS while establishing itself in the industrial environment. Laduzinsky, A. ... Dec 53
Thirteen new products launch Multibus II (N) Mar 21
Twelve manufacturers show support for Multibus II (N) ... Jun 24
VMEbus board runs DEC PDP-11 software (N) ... Jun 24
VMEbus demands high performance packaging. Laduzinsky, A. ... Aug 108
VMEbus market shows promise as US acceptance increases. Cope, M. ... Aug 110
VMEbus: 32-bit computer with many operating systems. Laduzinsky, A. ... Aug 93
VMEbus uses the 68020 32-bit processor. Laduzinsky, A. ... Apr 145
Will standards develop for serial communications buses? Laduzinsky, A. ... Oct 51

**MICROPROCESSORS**

Analog signal conditioners show MPU's influence. Laduzinsky, A. ... Sep 132
Dynamically testing single-chip microcomputers. King, R. ... Jun 196
Intel introduces 80386 32-bit chip, boards, and software (N) ... Oct 23
Low cost development of microprocessor system. Waymire, J. ... Nov 136
Sixteen-bit architecture upgrades STD Bus. Burckle, R. ... Dec 59
VMEbus uses the 68020 32-bit processor. Laduzinsky, A. ... Apr 145
Will the microprocessor revolution continue? Laduzinsky, A. ... Jan 13

**MINICOMPUTERS**

Fault-tolerant control means never having to say you're sorry. Laduzinsky, A. ... Feb 71
Perkin-Elmer presents a "cruncher" superminicomputer (N) ... Nov 19

**MONITORING AND ANNUNCIATING, see Data display**

**MOTION CONTROL**

High speed production benefits from motion detectors. Bailey, S. ... Sep 137
Microstepping a linear motor. Morris, H. ... Feb 83
Microstepping for greater position resolution. Arnold, Jr., F. ... Jan 111
Modular automation controllers cut cost, development time. Klein, G. ... Dec 66
Motor drives 1985: programmable motion control. Bailey, S. ... Apr 159
Position transducers: strategic components in motion control loops. Bailey, S. ... Dec 41
Powering the robotic arm. Morris, H. ... Mar 92
Servo design today: software closes the loop. Bailey, S. ... Feb 57
Single chopper drive handles stepper motors from 0.5 to 5.0 amps ... Mar 64
Step motion control 1985: direct digital incrementing. Bailey, S. ... Aug 49
Three-axis positioning by personal computer. Bailey, S. ... Aug 56

**MOTORS AND CONTROLLERS**

Brushless dc motor control. Valentine, R. ... Jul 134
Microstepping a linear motor. Morris, H. ... Feb 83
Microstepping for greater position resolution. Arnold, Jr., F. ... Jan 111
Motor drives 1985: programmable motion control. Bailey, S. ... Apr 159
Position transducers: strategic components in motion control loops. Bailey, S. ... Dec 41
Powering the robotic arm. Morris, H. ... Mar 92
Servo design today: software closes the loop. Bailey, S. ... Feb 57
Single chopper drive handles stepper motors from 0.5 to 5.0 amps ... Mar 64
Single motor multiple linear actuator controls 16 motions ... Sep 100
Step motion control 1985: direct digital incrementing. Bailey, S. ... Aug 49
Three-axis positioning by personal computer. Bailey, S. ... Aug 56

## O

**OBJECT DETECTION AND IDENTIFICATION, see Positioning**

**ON-LINE ANALYZERS**

On-line analyzers reach control room. Blickley, G. ... Dec 50
Tough sulphur dioxide monitor survives stack's wet scrubber ... Sep 94

**OPTOELECTRONICS**

Digital process measurements transmitted by fiber optics. Blickley, G. ... Jan 95

## P

**PERSONAL COMPUTERS**

Allen-Bradley will sell IBM industrial computers (N) ... May 24
College of unintended consequences. Laduzinsky, A. ... Nov 13
Future of STD Bus linked closely with IBM PC standards. Lee, E. ... Dec 62
Industrializing the personal computer. Kompass, E. ... Aug 70
Integrating IBM PC into STD Bus design. Finster, K. ... Dec 71
Low cost development of microprocessor system. Waymire, J. ... Nov 136
Microcomputer boards—supplying more. Laduzinsky, A. ... Apr 140
Peripherals: making intelligent controllers comfortable. Laduzinsky, A. ... May 63
Personal computers 1985: value added control. Bailey, S. ... Jul 66
Process control system integrates design and control. Babb, M. ... Nov 81
Simulating a servoloop on a personal computer. Bailey, S. ... Mar 101
Software eases real-time color graphics development. Laduzinsky, A. ... Mar 96
Software puts personal computers into distributed control. Bailey, S. ... Oct 65
Software will alter control practice in the 1980s. Bailey, S. ... May 89
STD Bus adopts multitasking and DOS while establishing itself in the industrial environment. Laduzinsky, A. ... Dec 53
Three-axis positioning by personal computer. Bailey, S. ... Aug 56

**PNEUMATICS, see fluid power**

**POSITIONING**

High speed production benefits from motion detectors. Bailey, S. ... Sep 137
Industry begins to apply vision systems widely. Morris, H. ... Jan 68
Microstepping a linear motor. Morris, H. ... Feb 83
Microstepping for greater position resolution. Arnold, Jr., F. ... Jan 111
Position transducers: strategic components in motion control loops. Bailey, S. ... Dec 41
Powering the robotic arm. Morris, H. ... Mar 92
Robot vision: bringing eyesight to the blind. Morris, H. ... Jan 64
Servo design today: software closes the loop. Bailey, S. ... Feb 57
Single motor multiple linear actuator controls 16 motions ... Sep 100
Step motion control 1985: direct digital incrementing. Bailey, S. ... Aug 49

Three-axis positioning by personal computer. Bailey, S. ... Aug 56

**POWER SUPPLIES AND CONTROLLERS**

Electronic power controllers, amplifiers increase load. Blickley, G. ... Jan 86

**PRESSURE**

Microtechnology spurs "smart" pressure instruments. Bailey, S. ... Jan 101

Micromechanics, fiber optics: new sensor performance. Babb, M. ... Nov 54

**PROCESS CONTHOL**

Advanced Control Conference: process simulation. Morris, H. ... Sep 155

Boiler dynamic load control and optimization. Polonyi, M. ... Sep 266

Choosing a petrochemical process control consultant. Senyard, W. ... Apr 304

Cobbles reduced on bar mill ... Apr 112

Combustion Engineering aids Arab process control (N) ... Jul 21

Distributed control systems: new, improved at ISA/85. Blickley, G. ... Sep 150

Expert system capabilities for distributed control. Moore, R. ... Apr 118

Faster chips for process control. Stohlberg, J. ... Nov 140

Is anyone interfacing process and management's computers? Morris, H. ... Jun 92

MAP's impact on process plants. McCarthy, J. ... 2Oct 67

Process control symposium scheduled by ISA division (N) ... Mar 21

Process control system integrates design and control. Babb, M. ... Nov 81

Process industries take one step at a time. Blickley, G. ... Jun 83

Process industry's newest challenge: integrated plant information. Runke, R. ... May 96

SCADA systems affected by distributed control. Blickley, G. ... Mar 79

Single loop controller still alive. Blickley, G. Jul 78

Sensor plots temperatures as it passes through processes ... Oct 39

Software eases real-time color graphics development. Laduzinsky, A. ... Mar 96

Toshiba moves up in Japanese process control (N) ... Oct 24

**PRODUCTIVITY, MANAGEMENT AND CONTROL**

CIM system goes beyond CAD/CAM. Searle, D. ... Feb 50

Industry begins to apply vision systems widely. Morris, H. ... Jan 68

Is anyone interfacing process and management's computers? Morris, H. ... Jun 92

Modeling management operations systems. Piltzecker, E. ... Jun 104

Retieval cycle reduced by half at plant using GE controlled system ... Dec 32

**PROCESS CONTROLLERS**

Distributed control systems: new, improved at ISA/85. Blickley, G. ... Sep 150

Process control at fingertips ... Jan 44

Process control system integrates design and control. Babb, M. ... Nov 81

Process controllers '85: standing alone or distributed. Bailey, S. ... Mar 71

Single loop controller still alive—in digital form. Blickley, G. ... Jul 78

Temperature loops with "knowledge-based" authority. Bailey, S. ... Jun 109

**PROCESS CONTROL SYSTEMS**

Distributed control system expandable for plantwide management. Blickley, G. ... Feb 80

Distributed control system uses open highway. Blickley, G. ... Apr 156

Expert system capabilities for distributed control. Moore, R. ... Apr 118

Fault-tolerant control means never having to say you're sorry. Laduzinsky, A. ... Feb 71

Is anyone interfacing process and management's computers? Morris, H. ... Jun 92

Operator interface improvements in distributed control. Blickley, G. ... Apr 152

Process controllers '85: standing alone or distributed. Bailey, S. ... Mar 71

Process industry's newest challenge: integrated plant information. Runke, R. ... May 96

Selecting a batch control system. Lippin, J. Jul 73

Software eases real-time color graphics development. Laduzinsky, A. ... Mar 96

**PROCESS CONTROL VALVES, see Valves**

**PROGRAMMABLE CONTROLLERS**

Close the quality loops to automate manufacturing. Laduzinsky, A. ... Nov 64

Connecting dissimilar controllers and LANs. Kmack, K. and Weaver, T. ... Oct 55

DC-3: an industrial expert system. Taylor, W. Aug 85

Dynamic reprogramming in the TI PM550 PC. Howell, L. ... Mar 212

Function chart programming for programmable controllers. Lloyd, M. ... Oct 73

GE's intelligent I/O may revolutionize PCs. Flynn, R. ... May 99

Gould adds two programmable controllers (N) ... Nov 19

Guardian will market Hitachi programmable controllers (N) ... Feb 29

Heads and tails of steel strip controlled ... Feb 42

Implementing system diagnostics and failure prediction. Cherba, D. ... Sep 159

IPC: most successful to date (N) ... May 19

Mitsubishi in U.S. marketing push (N) ... Jul 21

New programmable controllers: two ends of the spectrum. Flynn, R. ... Jan 77

Peripherals: making intelligent controllers comfortable. Laduzinsky, A. ... May 63

Programmable controller delivers fault tolerance. Laduzinsky, A. ... Feb 76

Programmable controller standards aim of IEEE (N) ... Mar 21

Programmable controller update for 1985. Flynn, R. ... Jan 79



# DRAFTING
## for your Personal Computer

DRAFTEC from Taylor Industrial Software is a drafting program with features carefully sclected to provide maximum drafting performance with minimum training.

Powerful and easy to use features such as library and block functions permit the rapid development and modification of drawings.

Systems including both hardware and software can be configured for under $7000.00*

TAYLOR
INDUSTRIAL SOFTWARE

12204-106 Ave. Edmonton, Canada T5N 3Z1 Tel: (403) 482-7547

* IBM PC with 192K, single drive, graphics monitor, Bausch and Lomb plotter and drafting software.

CIRCLE **84** ON INQUIRY CARD

**For all types of liquid level signalling and control...**

# The Gentech level sensor

Whether your need is for monitoring and controlling liquids in process plant in water boilers or other appliances, you'll find the new Gentech range of UL listed liquid level sensors versatile, durable, reliable and economical.

Suitable for high and low level applications, the range offers a choice of polysulfone or polypropylene construction and of internal or external mounting fittings.

Switching options include three Form A (SPST) types for signal to 250 VRMS maximum switching voltage, with a high power option for inductive loads able to switch 100 watts. A Form C (SPDT) for 100 VDC switching is also available.

Phone or write for brochure.

DUFFY INTERNATIONAL
DIVISION OF R.F. DUFFY ASSOCIATES, INC.

**Duffy International, 21 Storrs Avenue, PO Box 328, Braintree, Mass 02184 0328. Phone 617-848-3550. TWX 510-101-1547.**

CIRCLE **85** ON INQUIRY CARD

Proposed language standards for programmable controllers. Hollo, F. ... Sep 260
Retieval cycle reduced by half at plant using GE controlled system ... Dec 32
Speed increased on can production ... Mar 58
Using distributed programmable controllers in a structural board plant. Ouellette, R. ... Oct 177
Visual aid for selecting programmable controllers. Chester, G. ... Jan 178
**PROGRAMMING, see Software, control**

## R

**RELAYS AND SWITCHES**
Rapid transit cars use aerospace relays to control doors/lights ... May 52
Relays and switches retain key on-line role. Bailey, S. ... Nov 59
**ROBOTS**
Modular automation controllers cut cost, development time. Klein, G. ... Dec 66
Position transducers: strategic components in motion control loops. Bailey, S. ... Dec 41
Powering the robotic arm. Morris, H. ... Mar 92
Profitable robotic work cells from islands of automation. Morris, H. ... May 81
Programming a special effects robot. Regla, P. ... Aug 162
Protocol converter networks incompatible factory devices. Babb, M. ... Sep 149
Researchers study robots, automation in construction (N) ... Mar 21
Robot programming goes off-line. Morris, H. Sep 143
Robot vision: bringing eyesight to the blind. Morris, H. ... Jan 64
Single motor multiple linear actuator controls 16 motions ... Sep 100

## S

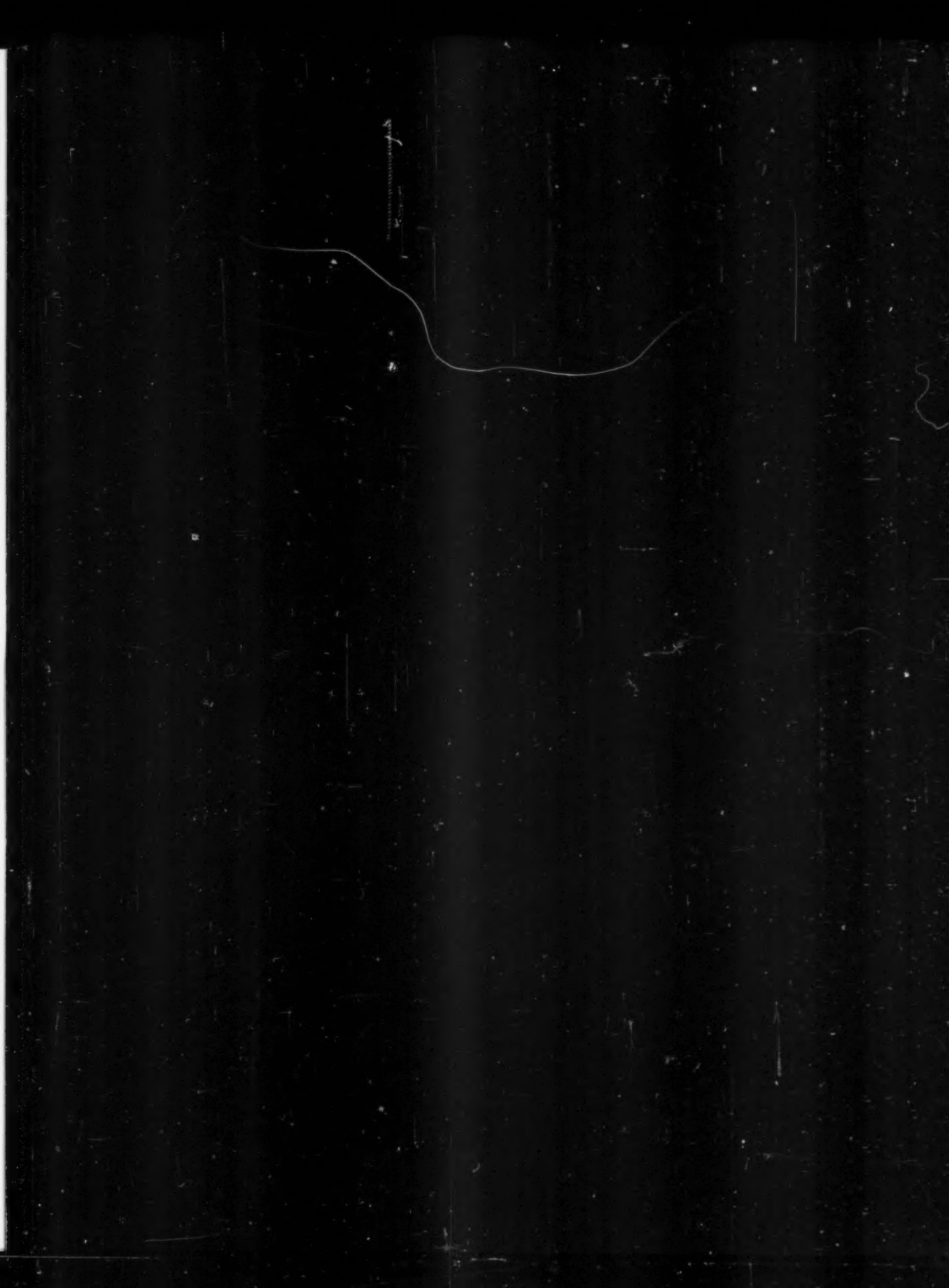
**SAFETY**
Alarm switches: last stands of process plant safety. Flynn, R. ... Mar 85
Get those loops closed! (ED) ... Sep 103
Process valves and actuators: meeting fire-safe requirements. Blickley, G. ... Sep 118
System senses tank leaks from outside the tank ... Apr 108
**SENSORS**
Calibration of velocity sensors for flow instrumentation ... Jun 64
Digital process measurements transmitted by fiber optics. Blickley, G. ... Jan 95
First monolithic 4-20 mA transmitter introduced (N) ... Jun 22
Flowmeter technologies: not standing still. Blickley, G. ... Aug 77
High speed production benefits from motion detectors. Bailey, S. ... Sep 137
Micromechanics, fiber optics: new sensor performance. Babb, M. ... Nov 54
Microtechnology spurs "smart" pressure instruments. Bailey, S. ... Jan 101
Position transducers: strategic components in motion control loops. Bailey, S. ... Dec 41
Sensor plots temperatures as it passes through processes ... Oct 39
System senses tank leaks from outside the tank ... Apr 108
Telemecanique opens sensor center (N) ... Sep 21
Tough sulphur dioxide monitor survives stack's wet scrubber ... Sep 94
**SERVOS**
Programming a special effects robot. Regla, P. ... Aug 162
Servo design today: software closes the loop. Bailey, S. ... Feb 57
Simulating a servoloop on a personal computer. Bailey, S. ... Mar 101
**SIGNAL TRANSMISSION, see Data transmission**
**SIGNAL CONDITIONERS AND CONVERTERS**
Analog I/O for the Multibus. Logan, M. ... Mar 110
Analog signal conditioners show MPU's influence. Laduzinsky, A. ... Sep 132
First monolithic 4-20 mA transmitter introduced (N) ... Jun 22
Today's analog-to-digital converter: going for it all with CMOS. Babb, M. ... Dec 47
Position transducers: strategic components in motion control loops. Bailey, S. ... Dec 41
**SIMULATION AND MODELING**
Advanced Control Conference: process simulation. Morris, H. ... Sep 155
Designing a solar thermal repowering system using dynamic simulation. Labbe, D. ... Dec 120
Eleventh Control Conference views on-line simulation (N) ... Dec 21
Modeling management operations systems. Piltzecker, E. ... Jun 104
Personal computers 1985: value added control. Bailey, S. ... Jul 66
Simulating a servoloop on a personal computer. Bailey, S. ... Mar 101
Software eases real-time color graphics development. Laduzinsky, A. ... Mar 96
**SOFTWARE, CONTROL**
Adapting Unix to the industrial market. Crow, D. ... Aug 100
Baseway software shown at IPC show (N) May 19
Black magic, black box, or black plastic control. Laduzinsky, A. ... Oct 13
Close the quality loops to automate manufacturing. Laduzinsky, A. ... Nov 64
DC-3: an industrial expert system. Taylor, W. Aug 85
Eleventh Control Conference views on-line simulation (N) ... Dec 21
Factory automation software can't be packaged (ED) ... Aug 47
Industrializing the personal computer. Kompass, E. ... Aug 70
Intel introduces 80386 32-bit chip, boards, and software (N) ... Oct 23
Personal computers 1985: value added control. Bailey, S. ... Jul 66
Programming a special effects robot. Regla, P. ... Aug 162
Proposed language standards for programmable controllers. Hollo, F. ... Sep 260
Robot programming goes off-line. Morris, H. Sep 143
Simulating a servoloop on a personal computer. Bailey, S. ... Mar 101
Software eases real-time color graphics development. Laduzinsky, A. ... Mar 96
Software puts personal computers into distributed control. Bailey, S. ... Oct 65
Software will alter control practice in the 1980s. Bailey, S. ... May 89
STD Bus adopts multitasking and DOS while establishing itself in the industrial environment. Laduzinsky, A. ... Dec 53
VMEbus board runs DEC PDP-11 software (N) ... Jun 24
VMEbus: 32-bit computer with many operating systems. Laduzinsky, A. ... Aug 93
**SPEED CONTROL**
High speed production benefits from motion detectors. Bailey, S. ... Sep 137
Position transducers: strategic components in motion control loops. Bailey, S. ... Dec 41
**STANDARDS**
A standard local network for industrial use. Pinkowitz, D. ... Oct 56
Autofact demonstration advances MAP (N) Dec 21
Data buses simplify MPU system integration. Floyd, R. ... Nov 75
Developing standards integrate factory floor devices. Moon, D. ... 2Oct 49
Factory automation: a new positioning for control companies. Laduzinsky, A. ... Jun 13
Function chart programming for programmable controllers. Lloyd, M. ... Oct 73
Industrial control becomes more international. Laduzinsky, A. ... Jul 13
On being number one and the success of standards. Laduzinsky, A. ... Apr 13
Programmable controller standards aim at IEEE (N) ... Mar 21
Proposed language standards for programmable controllers. Hollo, F. ... Sep 260
Standards moving toward performance rather than design. Vannah, W. ... May 79
The MAP specification. Crowder, R. ... 2Oct 22
What's new in control standards. Mason, H. Sep 122
Will standards develop for serial communications buses? Laduzinsky, A. ... Oct 51
**STEPPER MOTORS, see Actuators**
**SWITCHES, see Relays and switches**
**SYSTEM: ANALYSIS AND DESIGN**
Saving power in CMOS systems design. Niewierski, W. ... Nov 69
Implementing system diagnostics and failure prediction. Cherba, D. ... Sep 159

## T

**TEMPERATURE**
Micromechanics, fiber optics: new sensor performance. Babb, M. ... Nov 54
Sensor plots temperatures as it passes through processes ... Oct 39
Temperature loops with "knowledge-based" authority. Bailey, S. ... Jun 109
Temperature monitoring system pays for itself ... Sep 89
**TEST EQUIPMENT**
Automatic battery test systems modernized by updated approach ... Sep 84
DC-3: an industrial expert system. Taylor, W. Aug 85
DMM measures Hz and period ... Apr 114
MAP product testing gets under way. McMillan, A. ... 2Oct 39
New system integrates testing. Babb, M. ... Apr 166
**TESTING, INCLUDING PRODUCTION TEST**
Automatic battery test systems modernized by updated approach ... Sep 84
Close the quality loops to automate manufacturing. Laduzinsky, A. ... Nov 64
Dynamically testing single-chip microcomputers. King, R. ... Jun 196
New vision system—100 percent inspection at production line speeds ... Jul 41
**TRADE SHOWS**
Biggest Design Engineering show coming to Chicago (N) ... Jan 19
Buscon/86 premiers January 15-16 (N) ... Sep 21
Control Expo attracts 10,000 (N) ... Jul 21
Design Engineering Show activities for control engineers. Flynn, R. ... Feb 65
Distributed control systems: new, improved at ISA/85. Blickley, G. ... Sep 150
Fluid power exposition draws crowd in Chicago (N) ... Feb 21
Guide to Control Expo/85. Flynn, R. ... Apr 124
Here comes Autofact '85. Axelson, B. ... Sep 131
IPC: most successful to date (N) ... May 19
ISA/85 attendance sets new record (N) ... Dec 25
Mesucora doubles with scientific, electrical shows in Paris (N) ... Oct 23
New control products at ISA/85. Flynn, R. Sep 105
OEM Design Show scheduled in Philadelphia (N) ... Aug 21
Petro Expo: 200,000 square feet (N) ... Mar 21
Philadelphia hosts ISA/85 conference and exhibit (N) ... Sep 21
Plastics show stresses CIM (N) ... Aug 21
Vision '85 attracts 9,000 (N) ... May 19
Who's MAP compatible? (N) ... 2Oct 9
World's biggest electronics show: Munich's Electronica 84. Lee-Frampton, J. ... Jan 108

## V

**VALVES**
Change still ferments beneath the surface (ED) ... Oct 49
Process valves and actuators: meeting fire-safe requirements. Blickley, G. ... Sep 118
Valve actuators get smart. Blickley, G. ... Oct 81
**VISION, see also Positioning**
Industry begins to apply vision systems widely. Morris, H. ... Jan 68
New vision system—100 percent inspection at production line speeds ... Jul 41
Robot vision: bringing eyesight to the blind. Morris, H. ... Jan 64
Vision '85 attracts 9,000 (N) ... May 19
What goes there? Morris, H. ... Oct 60

## W

**WEIGHING AND BATCHING**
Selecting a batch control system. Lippin, J. Jul 73